IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Re:	Application of:	Francois BLAUDIN DE THE
	Serial No.:	10/583,626
	Filed:	April 10, 2007
	For:	FUEL ROD FOR A NUCLEAR REACTOR
	Art Unit:	3663
	Examiner:	Erin M.Boyd

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

May 8, 2009

APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

Sir:

Appellants submit this brief for the consideration of the Board of Patent Appeals and Interferences (the "Board") in support of their appeal of the Advisory Action dated February 25, 2009 and the Final Office Action dated December 10, 2008 in this application. The statutory fee of $540.00 is submitted concurrently herewith. If any additional fees are deemed to be due at this time, the Assistant Commissioner is authorized to charge payment of the same to Deposit Account No. 50-0552.

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1. REAL PARTY IN INTEREST

The real party in interest is Areva NP, a French corporation having a place of business in Courbevoie, France and the assignee of record of the entire right, title and interest in the above-identified patent application.

2. RELATED APPEALS AND INTERFERENCES

Appellants, their legal representatives, and assignee are not aware of any appeal or interference that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

Claims 6 to 13 are pending in the application. Claims 6 to 13 were rejected in the Final Office Action dated December 10, 2008. Claims 1 to 5 were canceled in a Preliminary Amendment filed on June 20, 2006.

The rejections to claims 6 to 13 thus are appealed. A copy of appealed claims 6 to 13 is attached hereto as Appendix A.

4. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the December 10, 2008 Final Office Action.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 6 recites a fuel rod for a nuclear reactor that is cooled by water, comprising: a cylindrical tubular cladding (for example, page 6, line 6; for example, tubular cladding 2 in Figure 1); a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding (for example, page 6, lines 24 to 26; for example, fuel pellets 3 in Figure 1); a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating

position inside the nuclear reactor (for example, page 8, line 20; for example, lower plug 10 in Figure 2), the cladding of the rod having an axis vertical (for example, page 6, lines 25 to 26; for example, tubular cladding 2 and axis 7 in Figure 1); and a second plug for tight closure of the second axial end of the cladding (for example, page 6, lines 6 to 8; for example, second plug 5 in Figure 1), the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower end (for example, page 6, lines 20 to 22; for example, fuel pellets 3 and lower plug 10 in Figure 2), and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug (for example, page 6, line 33 to page 7, line 4; for example, tubular cladding 2, helical spring 6, second/upper plug 5 and fuel pellets 3 in Figure 1), wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding (for example, page 9, lines 4 to 13; for example, first portion 11 in Figure 2), a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding (for example, page 9, lines 21 to 22; for example, second intermediate portion 12 in Figure 2) and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests (for example, page 10, lines 8 to 12; for example, third portion 13 and clearance 15 in Figure 2), so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding (for example, page 10, lines 24 to 27; for example, annular space 16 in Figure 2), a volume of the annular space being a function of expansion of gas in the fuel rod during operation (for example, page 11, lines 5 to 9).

Independent claim 11 recites a fuel rod for a nuclear reactor that is cooled by water, comprising: a cylindrical tubular cladding (for example, page 6, line 6; for example, tubular

cladding 2 in Figure 1); a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding (for example, page 6, lines 24 to 26; for example, fuel pellets 3 in Figure 1); a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating position inside the nuclear reactor (for example, page 8, line 20; for example, lower plug 10 in Figure 2), the cladding of the rod having an axis vertical (for example, page 6, lines 25 to 26; for example, tubular cladding 2 and axis 7 in Figure 1); and a second plug for tight closure of the second axial end of the cladding (for example, page 6, lines 6 to 8; for example, second plug 5 in Figure 1), the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower end (for example, page 6, lines 20 to 22; for example, fuel pellets 3 and lower plug 10 in Figure 2), and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug (for example, page 6, line 33 to page 7, line 4; for example, tubular cladding 2, helical spring 6, second/upper plug 5 and fuel pellets 3 in Figure 1), wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding (for example, page 9, lines 4 to 13; for example, first portion 11 in Figure 2), a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding (for example, page 9, lines 21 to 22; for example, second intermediate portion 12 in Figure 2) and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests (for example, page 10, lines 8 to 12; for example, third portion 13 and clearance 15 in Figure 2), so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding (for example, page 10, lines 24 to 27; for example, annular space 16 in Figure 2), wherein at least

a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium (for example, page 5, lines 10 to 11).

Dependent claim 7 recites the fuel rod according to claim 6, wherein the third cylindrical portion of the inner portion of the lower plug of the fuel rod has a diameter such that there remains, between the outer lateral surface of the third cylindrical portion and the inner surface of the tubular cladding, a radial clearance for assembly and passage of gas of between one and two tenths of a millimeter (for example, page 10, lines 8 to 17; for example, clearance 15 in Figure 2).

Dependent claim 8 recites the fuel rod according to claim 6, wherein the second cylindrical portion of the inner portion of the lower plug has a diameter of between 40% and 60% of the inner diameter of the tubular cladding (for example, page 9, lines 25 to 26) and a length in the axial direction of between 8 and 10 times the inner diameter of the tubular cladding (for example, page 11, lines 5 to 9).

Dependent claim 9 recites the fuel rod according to claim 6, wherein at least a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium (for example, page 5, lines 10 to 11, page 8, lines 8 to 9).

Dependent claim 10 recites the fuel rod according to claim 6, further comprising at least one cross-member in at least one zone of the second cylindrical portion, extending in an axial direction, the at least one cross-member constituted by a diametrically widened cylindrical portion of the second cylindrical portion that has an outer diameter that is substantially equal to the inner diameter of the tubular cladding that is reduced by an assembly clearance (for example, page 11, lines 25 to 31).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claim 12 was rejected under 35 U.S.C. 112, second paragraph. Claims 6, 12 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,804,710 to

Bresnick (hereinafter "Bresnick") in view of Applicant's purported admission (hereinafter "APA").[1] Claims 7 and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of U.S. Patent No. 4,046,631 to Clapham (hereinafter "Clapham"). Claim 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of U.S. Patent No. 4,120,752 to Ocken (hereinafter "Ocken"). Claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of U.S. 4,111,748 to Hayashi et al. (hereinafter "Hayashi"). Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick in view of Ocken.

7. ARGUMENTS

A. 35 U.S.C. §112 Rejections

Claim 12 was rejected under 35 U.S.C. 112, second paragraph for "being incomplete for omitting essential steps, such omission amounting to a gap between the steps." According to the Examiner, essential steps such as "providing all the structure claimed in Claim 6" and "stacking the fuel pellets in the cladding" are "essential" to the claimed invention.

Claim 12 recites "[a] method for manufacturing the fuel rod as recited in claim 6 comprising:

determining the volume of the second intermediate portion as a function of expansion of gases in the fuel rod during operation."

According to the MPEP, only claims which fail "to interrelate essential elements of the invention" should be rejected under 35 U.S.C. 112, second paragraph. (Manual of Patent Examining Procedure, § 2172.01). The Examiner's rejection appears to be based on a failure to include (not interrelate) essential elements of the disclosed invention. However, the appropriate basis for this type of rejection would be 35 U.S.C. 112, first paragraph. (see Id.). It is respectfully submitted that claim 12 recites manufacturing a full and complete structural device,

[1] The Final Office Action refers to claim 1 instead of claim 6. However, since claim 1 was previously canceled, it is assumed that the Examiner meant to refer to claim 6.

the fuel rod of claim 6, and that claim 12 does not fail "to interrelate essential elements" of the claim.

Reversal of the rejection under 35 U.S.C. 112, second paragraph is respectfully requested.

B. 35 U.S.C. §103(a) Rejections

1. Independent Claims 6 and Dependent Claims 12 and 13

Claims 6, 12 and 13 were rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick in view of APA. Claims 12 and 13 are dependent on claim 6.

Bresnick discloses a nuclear reactor fuel element comprising "a tubular cladding member or tube 1, of the desired diameter and length. Within this tube are placed fuel pellets 2 which fill the tube from the bottom end up to a distance from the top end sufficient to provide a fission gas receiving chamber 3 of the required dimension." (Col. 2, lines 17 to 22). Bresnick discloses similar end plugs 6 and 7. (Fig. 1). Bottom end plug 6, shown in detail in Fig. 2, on the outer part, has a body portion 8, a shank portion 9 projecting from the body portion 8, and a tapered end on the shank portion 9. In addition, bottom end plug 6 has a inner tapered section 13, a neck portion 16 projecting above inner tapered section 13, and a head portion 14 formed on neck portion 16. Head portion 14 serves to support fuel pellets 2 and is designed to isolate the fuel pellets 2 from weld joint 20 formed during manufacturing. (Fig. 1).

Claim 6 recites "[a] fuel rod for a nuclear reactor that is cooled by water, comprising:

a cylindrical tubular cladding;

a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding;

a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating position inside the nuclear reactor, the cladding of the rod having an axis vertical; and

a second plug for tight closure of the second axial end of the cladding, the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower

end, and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug, wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding, a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests, so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding, a volume of the annular space being a function of expansion of gas in the fuel rod during operation." (emphasis added).

As admitted by the Examiner in the December 10, 2008 Final Office Action, Bresnick fails to teach or show the requirement of "a volume of the annular space being a function of expansion of gas in the fuel rod during operation" of claim 6. As a result, the Examiner points to the Background portion of the present application (see par. [0008] of U.S. Patent Publication No. 2007/0242792 A1) as teaching that "a conventional method of increasing the volume for expansion of the gases in the fuel rod is to provide an upper and lower plenum in the fuel rod ...." (December 10, 2008 Final Office Action, p. 6). The Examiner, in response to Applicant's February 12, 2009 Response, clarified that:

> the teaching pulled from the admitted prior art is that placing a cross member on a conventional lower end plug, as seen in figures 1A and 1B, increases the volume for the expansion of gases inside a MOX fuel rod. The conventional lower end plug does not comprise three cylindrical portions of different diameters as does the modified lower end plug of Bresnick. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, nor is it

> that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. ... One of ordinary skill in the art would have interpreted the lower end plug of Bresnick to function similar to the combined lower end plug and cross-member.

(February 25, 2009 Advisory Action, p. 2) (citations omitted) (emphasis added).

In fact, the present specification states that "[a] conventional method for increasing volume for the expansion of gases inside MOX fuel rods involves interposing, *between the upper surface of the lower plug inside the cladding and the first lower end of the column of fuel pellets,* a cross-member or shim of stainless steel or zirconium alloy which is constituted by a tube that has a thick wall." (see par. [0008] of U.S. Patent Publication No. 2007/0242792 A1) (emphasis added). Such a tube is shown for example as tubular shim 9 in Fig. 1(b) of the present application. (see also, U.S. Patent No. 4,111,748, metallic supporting structure 3a in Fig. 1).

Bresnick, as disclosed above, teaches a bottom end plug 6 which includes a head portion for holding fuel pellets which is thermally isolated from the weld joint 20. Nothing is disclosed or suggested about the expansion of gases within the fuel rod in Bresnick. The APA in the specification merely teaches that it is conventional to put a shim on top of the bottom end plug in a fuel rod, such as on top of head portion 14 of the bottom end plug 6 of Bresnick, to increase free space within the fuel rod for the expansion of gases during operation. There is absolutely no teaching to modify the space below head portion 14 of Bresnick, and it is respectfully submitted that, on a fair reading of the purported admission, that such a modification, as described by the Examiner in the February 25, 2009 Advisory Action and highlighted above, would be solely based on hindsight reasoning.

Reversal of the rejections of claim 6 and its dependent claims 12 and 13 under 35 U.S.C. §103 is respectfully requested.

2. Dependent Claims 7 and 8

Claims 7 and 8, each dependent on claim 6, were rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of Clapham.

Bresnick is discussed above. Clapham discloses a "metal nuclear fuel can provided with a metal closure plug for closing an open end of the can, the plug having a closure portion dimensioned to engage the open end, a stem of reduced cross-sectional area extending axially from the dimensioned portion into the can interior, the stem terminating in a flange of enlarged cross-section formed of a material which is selectively susceptible of attack by hydrogen." (Col. 1, lines 46 to 54). The stem is provided to protect the peripheral weld of the plug to the can, by preventing hydrogen from migrating into the welds and causing such welds to weaken and/or fracture. (Col. 3, lines 18-32).

First, in light of the discussion above with respect to why claim 6 is not obvious over Bresnick in view of the APA, reversal of the rejections of claims 7 and 8 on the same basis is respectfully requested.

i. Dependent Claim 7: Argued Separately

Next, with further regard to claim 7, claim 7 requires that "the third cylindrical portion of the inner portion of the lower plug of the fuel rod has a diameter such that there remains, between the outer lateral surface of the third cylindrical portion and the inner surface of the tubular cladding, a radial clearance for assembly and passage of gas of between one and two tenths of a millimeter."

Both Bresnick and Clapham fail to teach or show the limitation of "a radial clearance for assembly and passage of gas of between one and two tenths of a millimeter" recited in claim 7. It is again respectfully submitted that it would not have been obvious to modify Bresnick in view of Clapham, nor would routine experimentation by one of skill in the art have come up with the limitation set in claim 7, as one of skill in the art would not have determined that the clearance size would be a result effective variable. Furthermore, the Examiner's allegation in the February 25, 2009 Advisory Action that "[o]ne of ordinary skill in the art would realize that increasing the clearance size between the fuel and cladding would increase the volume inside fuel rods for expansion of gases ..." demonstrates a lack of understanding of the claimed invention, since the annular space formed for the expansion of gases lies between the second portion of the inner

portion of the lower plug and the inner surface of the cladding, not the third portion. Finally, Ocken merely discloses a space between the fuel pellets 10 and the fuel rod cladding 16.

Reversal of the rejection of claim 7 for these reasons as well is respectfully requested.

i. Dependent Claim 8: Argued Separately

With further regard to claim 8, claim 8 recites "wherein the second cylindrical portion of the inner portion of the lower plug has a diameter of between 40% and 60% of the inner diameter of the tubular cladding and a length in the axial direction of between 8 and 10 times the inner diameter of the tubular cladding."

As with claim 7, both Bresnick and Clapham fail to teach or show the specific limitation that "the second cylindrical portion of the inner portion of the lower plug has a diameter of between 40% and 60% of the inner diameter of the tubular cladding" required by claim 8. It is again respectfully submitted that it would not have been obvious to one of skill in the art to modify Bresnick in view of Clapham, nor would routine experimentation by one of skill in the art have come up with the limitation set in claim 8. One of skill in the art would not have determined that the proportions of the lower plug diameter and inner diameter of the cladding would be a result effective variable. Furthermore, the length "of between 8 and 10 times the inner diameter of the tubular cladding," is not mere design but a important feature of the invention since it controls the volume of the annular space.

Reversal of the rejection of claim 8 for these reasons as well is respectfully requested.

3. Dependent Claim 9: Argued Separately

Claim 9 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of Ocken. Claim 9 is directly dependent on claim 6.

Bresnick is discussed above. Ocken discloses "[a] fuel pellet comprised of an inner cylindrical part provided with a mixture of uranium oxide and plutonium oxide, and an outer

annular part integral with the inner part and containing uranium oxide free of plutonium oxide." (See Abstract).

In light of the discussion above with respect to why claim 6 is not obvious over Bresnick in view of the APA, reversal of the rejection to dependent claim 9 on the same basis is respectfully requested.

Furthermore, in regard to claim 9, claim 9 recites "wherein at least a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium."

Bresnick is not designed to have expansion space or gas capabilities for use with MOX and thus fails to teach or show the use of "a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium" as required by claim 9. It is again respectfully submitted that it would not have been obvious to one of skill in the art to modify Bresnick in view of Ocken.

The Examiner addresses this contention in the February 25, 2009 Advisory Action, stating:

> it would have been obvious to one of ordinary skill in the art of nuclear fuel rod design at the time of the invention that uranium fuel can be replaced by MOX fuel wherein the motivation for using mixed oxide (uranium and plutonium) as fuel in the fuel rod of a reactor is to provide the necessary heat energy for a coolant flowing past the fuel rod, yet maintaining the structural integrity of said fuel rod (Ocken; column 2, lines 28-34). Upon replacing the uranium fuel with MOX fuel, one of ordinary skill in the art of nuclear fuel rod design would know that the fuel rod parameters (i.e. expansion space) would need to be modified to be suitable for MOX fuel.

(February 25, 2009 Advisory Action, p. 2). The problem with this allegation is that it is not the fuel rod parameters that need to be adjusted, it is the provision of structures internal to the fuel rod that provide an internal annular space for the expansion of gases. In fact, one of skill in the art of nuclear fuel rod design would know that Bresnick is not suitable for MOX fuel since it is

not designed to have expansion space or gas capabilities for use with MOX pellets, and would not have looked to Ocken or any other MOX reference to use with the Bresnick fuel rod.

Reversal of the rejection of claim 9 for these additional reasons as well is respectfully requested.

4. Dependent Claim 10: Argued Separately

Claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick, as applied to claim 6, in view of Hayashi. Claim 10 is dependent on claim 6.

Bresnick is discussed above. Hayashi discloses a conventional fuel rod having a lower plug 5 and supporting structure 3a (Fig. 1).

In light of the discussion above regarding independent claim 6, reversal of the rejection is respectfully requested.

Furthermore, in regard to claim 10, claim 10 recites "at least one cross-member in at least one zone of the second cylindrical portion, extending in an axial direction, the at least one cross-member constituted by a diametrically widened cylindrical portion of the second cylindrical portion that has an outer diameter that is substantially equal to the inner diameter of the tubular cladding that is reduced by an assembly clearance." The cross-member corresponds to cross-member 17 in Fig. 3 of the present application.

Both Bresnick and Hayashi fail to teach or show the limitation of "at least one cross-member in at least one zone of the second cylindrical portion, extending in an axial direction, the at least one cross-member constituted by a diametrically widened cylindrical portion of the second cylindrical portion that has an outer diameter that is substantially equal to the inner diameter of the tubular cladding that is reduced by an assembly clearance" as required by claim 10. The Examiner's position, in the February 25, 2009 Advisory Action, is difficult to understand, because the Examiner alleges there that "Applicant argues ... that cylindrical body 6e is the cross member" but in fact it was the Examiner, in the December 10, 2008 Final Office Action, who stated that "Hayashi et al. teaches a lower end plug 5 / supporting structure 3e

combination of a nuclear fuel rod that has a cross-member 6e in the zone of the second cylindrical portion 13 . . . ." (December 10, 2008 Final Office Action, p. 11). Hayashi does not disclose or teach the claimed cross member.

Reversal of the rejection of claim 10 for these additional reasons is respectfully requested.

5. Independent Claim 11: Argued Separately

Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bresnick in view of Ocken.

Bresnick and Ocken are discussed above.

Claim 11 recites "[a] fuel rod for a nuclear reactor that is cooled by water, comprising:

a cylindrical tubular cladding;

a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding;

a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating position inside the nuclear reactor, the cladding of the rod having an axis vertical; and

a second plug for tight closure of the second axial end of the cladding, the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower end, and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug, wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding, a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner

surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests, so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding,

wherein at least a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium." (emphasis added).

Bresnick, as admitted in the December 10, 2008 Final Office Action, fails to teach or show the limitation that "a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium" as recited in claim 11. It is again respectfully submitted, as discussed in detail with respect to claim 9 above, that claim 11 is not obvious to one of ordinary skill in the art over Bresnick in view of Ocken, given their disparate disclosures.

Reversal of the rejection of claim 11 for these reasons as well is respectfully requested.

CONCLUSION

It is respectfully submitted that the application is in condition for allowance. Favorable consideration of this appeal brief is respectfully requested.

Respectfully submitted,

DAVIDSON, DAVIDSON & KAPPEL, LLC

DATED: May 8, 2009

By: _____

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APPENDIX A:

PENDING CLAIMS 6 to 13 OF U.S.
APPLICATION SERIAL NO. 10/583,626

Claim 6 (previously presented): A fuel rod for a nuclear reactor that is cooled by water, comprising:

a cylindrical tubular cladding;

a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding;

a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating position inside the nuclear reactor, the cladding of the rod having an axis vertical; and

a second plug for tight closure of the second axial end of the cladding, the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower end, and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug, wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding, a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests, so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding, a volume of the annular space being a function of expansion of gas in the fuel rod during operation.

Claim 7 (previously presented): The fuel rod according to claim 6, wherein the third cylindrical portion of the inner portion of the lower plug of the fuel rod has a diameter such that there remains, between the outer lateral surface of the third cylindrical portion and the inner surface of the tubular cladding, a radial clearance for assembly and passage of gas of between one and two tenths of a millimeter.

Claim 8 (previously presented): The fuel rod according to claim 6, wherein the second cylindrical portion of the inner portion of the lower plug has a diameter of between 40% and 60% of the inner diameter of the tubular cladding and a length in the axial direction of between 8 and 10 times the inner diameter of the tubular cladding.

Claim 9 (previously presented): The fuel rod according to claim 6, wherein at least a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium.

Claim 10 (previously presented): The fuel rod according to claim 6, further comprising:

at least one cross-member in at least one zone of the second cylindrical portion, extending in an axial direction, the at least one cross-member constituted by a diametrically widened cylindrical portion of the second cylindrical portion that has an outer diameter that is substantially equal to the inner diameter of the tubular cladding that is reduced by an assembly clearance.

Claim 11 (previously presented): A fuel rod for a nuclear reactor that is cooled by water, comprising:

a cylindrical tubular cladding;

a column of nuclear fuel pellets that are stacked one on top of another inside the tubular cladding in the axial direction of the cladding;

a first plug for tight closure of a first axial end of the cladding of the rod arranged at a lower portion of the fuel rod when the rod is in an operating position inside the nuclear reactor,

the cladding of the rod having an axis vertical; and

a second plug for tight closure of the second axial end of the cladding, the column of fuel pellets resting on an inner portion of the first plug, referred to as a lower plug, via a first lower end, and being retained inside the tubular cladding by a compression spring that is interposed between a second upper axial end of the column of fuel pellets and an end of an inner portion of the second plug, referred to as the upper plug, wherein the inner portion of the lower plug engaged inside the tubular cladding successively comprises, in the axial direction and in a direction from the first towards the second end of the cladding, a first cylindrical portion that has a diameter that is substantially equal to the inner diameter of the tubular cladding, a second cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and a third cylindrical portion that has a diameter that is smaller than the inner diameter of the tubular cladding and that is greater than the diameter of the second cylindrical portion so that there remains, between a lateral outer surface of the third cylindrical portion and an inner surface of the tubular cladding, a radial clearance for passage of gas and a substantially planar end surface on which the first end of the column of fuel pellets rests, so that an annular space for expansion of gas is formed between the outer surface of the second portion of the inner portion of the lower plug and the inner surface of the cladding,

wherein at least a portion of the fuel pellets of the column of fuel pellets comprises one of plutonium oxide and a mixed oxide of uranium and plutonium.

Claim 12 (previously presented): A method for manufacturing the fuel rod as recited in claim 6 comprising:

determining the volume of the second intermediate portion as a function of expansion of gases in the fuel rod during operation.

Claim 13 (previously presented): The fuel rod as recited in claim 6 wherein a pressurization gas and gases released by the fuel pellets during operation fill the annular space.

APPENDIX B

Evidence Appendix under 37 C.F.R. §41.37(c)(ix):

No evidence pursuant to 37 C.F.R. §§1.130, 1.131 or 1.132 and relied upon in the appeal has been submitted by appellants or entered by the examiner.

APPENDIX C

Related proceedings appendix under 37 C.F.R. §41.37(c)(x):

As stated in "2. RELATED APPEALS AND INTERFERENCES" of this appeal brief, appellants, their legal representatives, and assignee are not aware of any appeal or interference that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.